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A CONTINUOUSLY CIRCULATING HYPERPOLARIZED XENON NMR APPARATUS TO PRODUCE HIGH ^{129}Xe POLARIZATION FOR SPINOE ENHANCEMENT EXPERIMENTS.

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ABSTRACT

Nuclear Magnetic Resonance (NMR) Spectroscopy has become a powerful analytical tool in recent years for solid state chemistry studies. However, studying surfaces using NMR is challenging because of the low sensitivity. Optical Pumping allows for a method to dramatically increase the NMR signal from surface nuclei. In this investigation, ^{129}Xe is optically polarized via a laser within a continuously re-circulating apparatus. Using this experimental setup, enhancements of up to 69% ^{129}Xe polarization was achieved 2 minutes after circulation. This polarization was then transferred to ^{29}Si nuclei of porous Si samples and examined with NMR. Enhancement signals from ^{29}Si atoms via the Spin Polarization Induced Nuclear Overhauser Effect (SPINOE) were 8-32 times the normal signal. SPINOE experiments conducted with ^{129}Xe to ^{13}C polarization transfer in $^{13}CD_3OD$ on low surface area titania coated fibers yielded an enhancement of 14 times.